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S P E C I F I C A T I O N S

SECTION 07542 – THERMOPLASTIC POLYOLFIN ROOFING
SECTION 07532 – ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING
SECTION 07600 – SHEET METAL FLASHING AND TRIM

PART 1 – GENERAL

1.01 RELATED DOCUMENTS: Bid Form, General Conditions and Drawings apply to work in this section.

1.02 SUMMARY: The intent of this section is to:

- Remove chiller and roof tops units scheduled to be removed and related components.
- Remove existing roofing system down to insulating concrete deck or concrete deck.
- Repair existing insulating concrete deck.
- Install base sheet, insulation and Dens Deck roof sheathing board.
- Install new roof drains and drain lines.
- Install fully adhered 0.060" TPO roofing membrane and associated flashings.

- **Alternate Bid #1** Install fully adhered 0.060" EPDM roofing membrane and associated flashings

The extent of work is shown on the drawings.

1.03 QUALITY ASSURANCE: Obtain materials from a single manufacturer or supplier to the greatest extend possible.

All roofing shall be installed in accordance with the manufacture's specification and details. More stringent requirements of this section and Drawing shall govern unless they conflict with manufacture's warranty requirements. In this case, the Contractor is responsible for notifying the Engineer of such conditions.

Prior to beginning the work, the Contractor will be required to meet at the site with the Owner's representative and Engineer for a preconstruction conference.

This work shall be performed by skilled mechanics that are trained and experienced in the installation of the specified roofing system.

Perform roofing, sheet metal work and single ply membrane with skilled mechanics in strict accordance with the standards detailed and recommended in the Roofing and Waterproofing Manual, Fifth Edition, 2001, by the National Contractors Association and the Architectural Sheet Metal Manual, Fifth Edition, 1993, by the Sheet Metal and Air Conditioning Contractors National Association, Inc.

1.04 SUBMITTALS: Submit to the Engineer not less than 7 days prior to start of work:

- Contractor must obtain a City of Fredericksburg Business License (available through the Commissioner of Revenue) before start of work.
- Three copies of product data for each type of product specified in Part 2. Submit manufacturer's detailed technical product data, installation instructions and recommendations, including necessary data to document that materials comply with requirements.
- Three copies of manufacturer's standard color charts for paints and coatings.
- Three copies of certifications by manufacturers of roofing and insulating materials that all materials supplied comply with all requirements of the identified ASTM and other industry standards or practices.
- Three copies of certification from the manufacturer and /or Applicator that the system specified meets all codes as required by the Specification and authority having jurisdiction.
- Three copies of Material Safety Data Sheets (MSDS).
- Sample copy of roofing manufacturer's 15 year system warranty.
- Sample copy of Contractor's project warranty.

1.05 DELIVERY STORAGE AND HANDLING: Deliver materials to the project site and store as close as possible to the point of installation to minimize damage while handling.

All products delivered to the job site shall be in the original unopened containers or wrappings bearing all seals and approvals.

Handle all materials to prevent damage. Place all materials on pallets and fully protect from moisture.

Membrane rolls shall be stored lying down on pallets and fully protected from the weather with clean canvas tarpaulins. Unvented polyethylene tarpaulins are not accepted due to the accumulation of moisture beneath the tarpaulin in certain weather conditions that may affect the ease of membrane weldability.

All adhesives shall be stored at temperatures between 40º F (5º C) and 80º F (27º C). Read instructions contained on adhesive canister for specific storage instructions.

All flammable materials shall be stored in a cool, dry area away from sparks and open flames. Follow precautions outlined on containers or supplied by material manufacturer/supplier.

All materials which are determined to be damaged by the Owner's Representative are to be removed from the job site and replaced at no cost to the Owner.

Protect roofing insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

1.06 PERFORMANCE REQUIREMENTS:

General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing and base flashings shall remain watertight.

Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist uplift pressure calculated according to ASCE/SEI 7.

Corner Uplift Pressure: -77 psf
Perimeter Uplift Pressure: -59 psf

Field-of-Roof Uplift Pressure: -32 psf

1.07 JOB CONIDTIONS: Proceed with the tear-off and installation of roofing only when existing and forecasted weather conditions will permit work to be performed in accordance with this specification, the manufacturer's specification and warranty requirements. Do not subject the roof deck or building's contents to water damage.

Work can be performed between the hours of 7:00 am through 5:00 pm Monday through Saturday. Crane operation must be performed during Saturday mornings and must be closely coordinated with City and other Authorities having jurisdiction. Provide traffic protection and flagmen as required.

The Contractor is responsible for providing all protection required to prevent damage to property or injury to persons.

Provide positive retaining barricades on ground below work areas to prevent injury to pedestrians and damage to property. Provide signage to direct pedestrians and traffic as required.

Protect adjacent building surfaces and property from spilling and splattering of roofing materials. Clean all spilled and splattered materials at once.

All roofing membrane seams shall be fully completed before leaving the job site each day.

All surfaces to receive membrane or flashings shall be dry. Should surface moisture occur, the Contractor shall provide the necessary equipment to dry the surface prior to application.

All new and temporary construction, including materials, equipment and accessories, shall be secured in such a manner as to preclude wind blow-off and subsequent roof or equipment damage.

The Contractor is cautioned that certain single ply membranes are incompatible with asphalt, coal tar, heavy oils, roofing cements, creosote and some preservative materials. Such materials shall not remain in contact with single ply membrane. The Contractor shall consult the membrane manufacturer regarding compatibility, precautions and recommendations. Contractor shall provide separator sheets, coverings or use other approved methods to ensure there is no contact between incompatible materials.

Sequence work to avoid use of newly constructed roofing as a walking surface or for equipment movement and storage.

Schedule tear-off only when all materials necessary for the complete roof installation are on hand.

The Contractor shall provide all necessary protection and barriers to segregate the work area and to prevent damage to adjacent areas. A substantial protection layer consisting of plywood over rigid insulation boards shall be provided for roof areas that receive rooftop traffic during construction.

Prior to and during application, all dirt, debris and dust shall be removed from surfaces either by vacuuming, sweeping, blowing with compressed air and/or similar methods.

The Contractor shall follow all safety regulations as required by OSHA and any other applicable authority having jurisdiction.

The Contractor shall take precautions that storage and/or application of materials and/or equipment does not overload the roof deck or building structure.

Flammable adhesives and deck primers shall not be stored and not be used in the vicinity of open flames, sparks and excessive heat.

The Contractor shall conduct fastener pullout tests in accordance with the latest version of the SPRI/ANSI Fastener Pullout Standard to verify condition of the deck/substrate and fastener pullout values.

Precautions shall be taken when using adhesives at or near rooftop vents or air intakes to prevent fumes from entering the building.

By submitting a bid, the Contractor represents that he has visited the site and become familiar with all details of the work and working conditions and verified all dimensions in the field. Contractor shall notify Engineer of any discrepancy before submitting bid.

1.08 TELECOM COORDINATION: Contractor must coordinate with tele-communications equipment representative to ensure telecom is given proper notice to lift/move/protect their equipment as required to allow roof replacement. The tele-communications equipment representative is Ms. Larkin, AT&T, phone number: 301.651.9344 or KLarkin@nbcllc.com.

1.09 HVAC COORDINATION: Contractor must coordinate with city selected HVAC contractor for use of crane to hoist equipment to/from roof. Also coordinate with HVAC contractor where they need to install piping penetrations through wall and deck for new and existing equipment. Penetrations through roofing system will be flashed by roofer. Extent of presently know work is shown on the drawings.

1.10 REMOVAL OF ABESTOS CONTAINING MATERIALS: The City will provide information on asbestos containing materials. All identified asbestos materials shall be removed in a manner that complies with state and local regulations concerning removal, handling and disposal of asbestos containing materials.

1.11 WARRANTIES: Provide two year Contractor warranty, covering work, including membrane roofing, base flashing, roofing insulation, and fasteners.

Provide manufacturer's 15 year written warranty, without monetary limitation, signed by roofing system manufacturer agreeing to promptly repair leaks in the roof membrane and base flashings resulting from defects in materials or workmanship for the warranty period. Warranty includes membrane roofing, base flashings, roof insulation, fasteners, cover boards, base sheet, roofing accessories and other components of membrane roofing system.

PART 2 – PRODUCTS

2.01 General: Use generic and brand name materials specified below. All exceptions must be approved by the Engineer in writing, upon request of the Contractor, prior to delivery of alternate material to the site. Remove non-approved and damaged materials from the site immediately.

Replacement items shall match existing items in material, size, shape, weight, finish and color; unless otherwise specified. Use materials which are fully compatible with indicated substrates.

Store materials in accordance with manufacturer’s recommendations.

2.02 ROOFING MATERIALS: Obtain all roofing materials from a single source.

- TPO (Thermoplastic Polyolefin Sheet): ASTM D 6878, internally fabric or scrim reinforced, uniform, flexible hot-air weldable TPO sheet, 0.060" thick standard color by one of the following manufacturers:

- Spectro-weld by Carlisle
- Ultraply by Firestone
- JM TPO 60 by Johns Manville
- VerisWeld by Versico

- Sheet Flashing: Manufacturer's standard unreinforced thermoplastic polyolefin sheet flashing, 55 mils thick, minimum, of same color as sheet membrane.

- Laminated Metal: Manufacturers standard metal 0.040" prefinished aluminum or 24 gauge G90 galvanized metal hot-air weldable, capable of forming into variety of shapes and profiles. Color: chosen by Owner and to be selected from manufacturer's standard color chart.

- Premanufactured Boot Flashing: Manufacturers standard hot-air weldable boot flashing

- Bonding Adhesive: Manufacturer's standard.

- Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

- Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick (25 mm wide by 1.3 mm thick), prepunched.

- Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

- Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

- Membrane Fastener: #15, heavy-duty, stainless steel, shank diameter 0.21 inch, thread diameter 0.26 inch., diving head diameter 0.435 inch #3 Phillips. Provide in length to penetrate through roof sheathing (DensDeck Prime).

- Membrane Fastening Plate: 3 or 2 inch round, 26 gauge 304 stainless steel.

- General Purpose Sealant: Manufacturers standard general purpose sealant to be used on membrane applications.

- Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick, and acceptable to membrane roofing system manufacturer. Provide 600 linear feet of walkway in base bid. For Base Bid, provide product that is designed for heat welding to roofing membrane surface.

2.03 ALTERNATE BID ROOF MATERIALS (MEMBRANE): Obtain all roofing materials from a single source.

- EPDM (Ethylene-Propylene-Diene-Monomer): ASTM D 4637, Type 1, non reinforced, uniform flexible EPDM sheet, 60 mills thick by one of the following manufacturers.

- Sure Seal by Carlisle
- RubberGard by Firestone
- VersiGard by Versico
- SPM 60 by Schuller

- Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

- Sheet Flashing: 60-mil- (1.5-mm-) thick EPDM, partially cured or cured, according to application.

- Bonding Adhesive: Manufacturer's standard, water based.

- Seaming Material: Manufacturer's standard, synthetic-rubber polymer primer and 3-inch- (75-mm-) wide minimum, butyl splice tape with release film.

- Lap Sealant: Manufacturer's standard, single-component sealant, colored to match membrane roofing.

- Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.

- Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.

- Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening membrane to substrate, and acceptable to roofing system manufacturer.

- Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, reinforced EPDM securement strips, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.

2.04 SHEET METAL FLASHING MATERIALS:

- Prefinished Aluminum: ASTM B 209, 0.040” inch thick. Form as indicated on the Drawing. Commercial quality primed and finished on one side (Pac-Clad Kynar 500 Prefinished Aluminum by Petersen Aluminum). Color: chosen by Owner and to be selected from manufacturer's standard color chart.

- Stainless Steel (SS): Type 304, ASTM A 167, with AISI 2D finish, dead soft, fully annealed, 20 gauge inch thick except as otherwise indicated.

2.05 SHEET METAL FABRICATIONS:

- Cleats: Fabricate cleats of same material and thickness as the component being secured. Provide 3 inch (minimum) vertical leg and a 5/8 inch long break at a maximum of 30 degrees from the plane of the vertical leg in accordance with SMACNA Figure 2-1, Detail 1.

- Coping: Fabricate from 0.040 inch thick prefinished aluminum in 10 foot maximum lengths. Provide mitered, sealed and pop riveted corner sections extending 18 inches in each direction from corners. Fabricate 18 inch long end sections with mitered, sealed and pop riveted up/out turned end dams. Fabricate 12 inch long back up plates same width as coping top at all joints. Fabricate 6 inch long cover plates same profile width as coping at all joints.

- Counterflashing: Fabricate from sheet metal type indicated with 4 inch face height (minimum) or as indicated on Drawing. Lap roofing system base flashing 4 inches minimum. Lap sections 4 inches and seal with concealed bead of sealant. Fabricate with hemmed drip edge at base and with crimp in face so when secured “spring action” will hold base of counterflashing tight to base flashing surface.

- Drip Edge: 0.040 inch prefinished aluminum drip edge; field verify dimensions and fabricate in accordance with Drawing. Prefabricate corners and end pieces in shop with mitered joints. Lap sections 4 inches and seal face with concealed bead of sealant.

- Gutter: 0.032” Prefinished Aluminum Style A. Color: chosen by Owner and to be selected from manufacturer's standard color chart.

- Gutter Strap: Fabricate from 0.032” prefinished aluminum to size, spacing and fastening requirements as shown on the Drawing.

- Receiver (SS): Fabricate from 20 gauge stainless steel to size and profile shown on Drawing. Provide 4 inch overlap and solder all seams watertight.

2.06 MISCELLANEOUS MATERIALS:

- Anchor Bolts: Federal Specification FF-S-325, Group II, Type 4, Class 1 or Type 3, Class 3; ½ inch diameter galvanized steel anchor bolt stud with expansion collar (Power-Bolt or Lok-Bolts by Powers). Length to penetrate substrate a minimum of 2 1/4 inches.

- Band Clamp: 1/2 inch wide band with slotted worm drive mechanism. All components stainless steel.

- Base Sheet: ASTM D 4897, asphalt coated fiberglass felt base sheet, approved by roofing system manufacturer.

- Brick: ASTM C 216, Grade SW. Color and size to match existing.

- Conduit Support Saddle: Form from Unistrut support stands and metal angles.

- Drain (roof): Cast iron roof drain with flange, flashing ring and mushroom dome (Wade W-3000, by Tyler Pipe). Field measure to fit existing storm drain lines.

- Fasteners (base sheet): (Zonolite fasteners by Es-Products or roofing manufacturer approved fastener). Length 1 3/4 inch or length required to provide a minimum pull out resistance of 40 pounds.

- Gypsum/Concrete Mix (deck repair material): Pyrofill by The Poteet Group (Charlotte, NC). Available from Morris Ginsberg, Baltimore, MD 410-732-3200.

- Insulation (flat polyisocyanurate): Fed Spec CSI HH-1-1972, polyisocyanurate, faced both sides, 2 inch thick as indicated on Drawings

- Insulation (tapered polyisocyanurate): Fed Spec CSI HH-1-1972, polyisocyanurate, tapered at 1/8 inch per foot at main/side roofs and 1/4 inch per foot at low roof. Minimum thickness 1/4 inch.

- Metal Angle: ASTM A 36 carbon steel rolled of structural quality. Thickness and sizes to match existing adjacent angle.

- Nails (wood): Hot-dip galvanized steel common nails, length to penetrate substrate 1 1/4 inches.

- Nailins: Fed Spec FF-S-325, Group V, Type 2, Class 3; zinc alloy body, 1/4 inch diameter; steel pin. Length sufficient to penetrate substrate 1 1/2 inches (Zamac Nailins by Rawl or equal).

- Mortar: ASTM C 270 proportion specification, Type N, 1 part Portland cement, 1/2 to 1 1/4 parts hydrated lime, 3 3/8 to 6 3/4 parts clean washed sand (not less than 2 1/4 and not more than 3 times the sum of the separate volumes of cementitious materials) and the maximum amount of water which produces a workable consistency (Portland Cement-Lime Color Mortar Mix by Glen-Gery). Color: to match existing.

- Paint System (basic metal): Primer: (Dura Clad Alkyd White Metal Primer by Duron). Top coat: (Dura Clad Alkyd Gloss Enamel by Duron). Apply primer and paint in accordance with manufacturer's recommendations. Color to be selected by Owner from manufacturers standard color chart.

- Pipe (fittings): ASTM C 923, (QwikSeal by Fernco).

- Pipe (cast iron): ASTM A 74, Service Grade (SV) Match to existing diameter, cast iron pipe and fittings to be used for this work. Use ASTM C 564 rubber gaskets for pipe and fitting. EPDM (rubber) no-hub (plain end flexible) pipe couplings, with stainless steel clamp, may also be used. Provide all plumbing accessories required to tie drain into existing storm drain line.

- Plywood: APA rated sheathing, exterior, thickness as indicated, pressure treated in accordance with American Wood Preservers Association Standard C27 with an approved

- Rubberized Asphalt Sheet Membrane: Self adhering rubberized asphalt bonded to polyethylene sheeting and formed into flexible sheets, 56 mils minimum thickness (GRM 350 by W.R. Grace and Co.).

- Screws (SS): ASTM A 478, Type 304 stainless steel, pan or truss head, with neoprene washers, No. 8 x 1/2 inch for metal to metal; No. 10 x 1 1/2 inches for metal to wood.

- Sheathing (Coverboard): DensDeck® Prime, a fire-tested, fiberglass-mat faced gypsum roof board with pre-primed surface on one side. Thickness: 1/2 inch and 5/8 inch; Width and Length: 4 feet by 8 feet; Min. weight: 1.975 psf; Surfacing: Fiberglass mat with non-asphaltic coating; Flexural Strength, Parallel (ASTM C473): 80 lbf, minimum; Permeance (ASTM E96): Not more than 35 perms; R-Value (ASTM C518): Not less than 0.56; Water Absorption (ASTM C1177): Less than 10 percent of weight; Compressive Strength (Applicable Sections of ASTM C472): 500 - 900 pounds per square inch; Surface Water Absorption (ASTM C473): Not more than 2 grams.

- Sheathing (Deck Patches): ToughRock Fireguard C, Thickness: 1/2 inch; Width and Length: 4 feet by 8 feet; Min. weight: 2.0 psf; Surfacing: paper facing; Flame Spread ASTM E 84: 15; Smoke Spread: 0

- Sealant (polyurethane): ASTM C 920, Grade NS, Class 25, one (Type S) or two (Type M) part polyurethane, non-sag, sealant (Sikaflex 1a or 2c by Sika; Vulkem 921 or 922 by Mameco; ChemCalk 900 or 2641 by Bostik; Dynatrol I or II by Pecora; Sonolastic NP1 or NP2 by Sonneborn). Color: Standard to blend with primary material at sealant line.

- Steel Roof Deck: 20 gage steel sheet; minimum yield strength 33,000 psi; galvanized to ASTM A653 G50; wide rib configuration, designed in accordance with Roof Deck Specifications of the Steel Deck Institute. (Type B by United Steel Deck, Inc., or equal)

- Wood (blocking, nailers,): Grade 2 or better SYP, pressure treated in accordance with AWPA Standard C-2 (0.040 pounds of oxide per cubic foot) with marks certifying conformance.

PART 3 – EXECUTION

3.01 DEMOLITION: Use care not to damage building components that are to remain in place or be reused. Replace, at no additional cost the Owner, all items noted to be reused that are damaged beyond the point that they can be effectively reused.

Provide watertight temporary tie-ins where new roofing meets existing at the end of every day or if rain is expected. **NOTE: This is an absolutely essential requirement since this roof is over occupied space.**

Prior to any demolition, water test all roof drains and storm drain lines with a 3/4 inch diameter garden hose flowing at maximum capacity, about 5 gallons per minute. Report all blockages to the Owner and Engineer immediately. All blocked drains and storm drain lines discovered after demolition has begun, will be cleaned out and made free draining (> 5 gallons per minute) at no cost to the Owner

Remove all existing roofing systems down to insulating concrete deck or concrete deck along with all base flashings, counterflashings, vent pipe flashings, pitch pans, abandoned curbs, roof drains and other items not indicated to be reused. Use care not to damage items that are to remain in place or items noted to be reinstalled. Contractor shall replace, at no additional cost to the Owner, all items to remain or noted to be removed and reinstalled which are damaged beyond reuse due to improper removal and / or storage procedures.

Remove existing chiller, exhaust fan and all related abandoned penetrations as indicated on the Drawings. Also, remove four roof top units, pitch pans, supports and all related penetration located at the east side roof. Coordinate disconnection of units and access to interior spaces with owner. Owner/separate contractor will disconnect units.

At areas indicated where membrane extends up and over parapet wall, trim existing through wall flashing at face of brick.

Remove all one way moisture vent pipes at insulating concrete deck areas.

Existing flat roof system consists of gravel surfaced asphalt built-up-roof applied directly to the insulating concrete/concrete surfaces. At elevator penthouse roof, an EPDM membrane with fiberboard covers the gravel surfaced asphalt built-up-roof.

3.02 SHEET METAL FABRICATION: Fabricate sheet metal flashing and trim to comply with Drawings and recommendations of SMACNA's "Architectural Sheet Metal Manual" and the following:

- Field verify all dimensions prior to fabricating new metal flashings.
- Comply with details shown to fabricate sheet metal flashing and trim that fit substrates and result in waterproof and weather-resistant performance once installed. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
- Form exposed sheet metal work that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems.
- Separate metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact with asphalt mastic or other permanent separation as recommended by manufacturer.
- Conceal fasteners where possible. Exposed fasteners are not allowed on faces of sheet metal exposed to public view.
- Fabricate cleats and attachment devices from same material as sheet metal component being anchored or from compatible, noncorrosive metal recommended by sheet metal manufacturer. Use material as recommended by SMACNA manual or sheet metal manufacturer for application but never less than thickness of metal being secured.

3.03 DECK INSPECTION AND TESTING OF DECK: At the completion of roofing system demolition, inspect the existing insulating concrete deck for deteriorated sections. Perform a minimum of 10 pullout tests on various areas of the insulating concrete deck with an average pullout resistance not less than 40 pounds per fastener. Provide alternate fasteners as required to obtain required test value.

3.04 ROOF SUBSTRATE SURFACE PREPARATION: The existing and/or repaired insulating concrete deck shall be clean, dry, and free from debris and smooth with no roughness or contamination. Remove and repair deteriorated and/or wet areas of insulating concrete fill. Cut back wet and deteriorated insulating concrete to sound material. Allow area to dry thoroughly then fill area with gypsum patch mix filled flush with surrounding deck surface. Provide 100 square feet of deteriorated deck patching material (4 inch average thickness) in base bid and provide unit price for deteriorated deck patching.

3.05 BASE SHEET: Mechanically fasten base sheet to the roof deck in accordance with manufacturer's fastening pattern as required by preconstruction fastener load test. Prior to construction, provide pull test for proposed anchors on insulating concrete deck. Base sheets should be properly shingled to shed water.

3.06 INSULATION AND SHEATHING INSTALLATION: Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

Comply with roofing system manufacturer's written instructions for installing roof insulation.

Adhesive used to secure insulation and corner boards shall be applied only to properly prepared and pre-approved substrates, free of any debris, dirt, grease, oil or moisture.

The minimum product temperature at time of application shall be 70 degrees F. Adhesives shall not be applied when surface or ambient temperatures are below 40 degrees F or above 110 degrees F.

Adhesive rates are to be increased in roof perimeter and corner zones according to manufacturer's recommendations.

Set first layer of insulation on base sheet in manufacturer's recommended adhesive. First layer is flat over the entire roof deck area. Place the boards onto the adhesive and walk on the boards spreading the adhesive for maximum contact. Set each layer of insulation in a uniform coverage of full-spread adhesive, firmly pressing and maintaining insulation in place.

Install tapered insulation to conform to slopes indicated on drawing fully adhered in adhesive. Apply at rate recommended by roofing assembly manufacturer to achieve specified wind uplift ratings.

Install crickets and tapered edge strips in adhesive.

Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding ¼ inch with insulation. Cut and fit insulation within ¼ inch of nailers, projections, and penetrations.

Damaged corners shall be cut out and replaced with an insulation piece a minimum of 12 inch x 12 inch Pieces which are cut from larger panels and are smaller than one square foot are not acceptable.

Trim insulation at roof drains to provide minimum 36 inch square sump around drains and completed surface does not restrict flow of water to the drains.

When multiple layers of insulation are installed each layer should be offset from the previous layer a minimum of 12 inches on center.

After insulation installation is complete cover entire area with specified cover board. Cut board to fit and conform to ridges, valleys slopes and penetrations. Bond to insulation surface with adhesive. Install no more than can be covered during the same working day.

NOTE: The Owner will not accept ponding (greater than 1/4 inch deep) after 36 hours. For this reason, it is the responsibility of the Contractor to confirm positive slope to the drains prior to installing the roof membrane. Use a string line and level to confirm that there will be **NO PONDING ON THIS ROOF MEMBRANE.** If ponding does occur, the Contractor may be required to remove and reconstruct ponding sections of the roof at no additional cost to the Owner.

3.07 MEMBRANE ROOING SYSTEM: Apply membrane roofing over area to receive roofing according to membrane roofing system manufactures written instructions. Unroll membrane roofing and allow to relax 30 minutes minimum before installing.

Accurately align membrane roofing and maintain uniforms side and end laps of minimum dimensions required by manufacturer. Stagger end laps.

Apply adhesive to substrate and underside of membrane roofing at rate required by manufacturer and allow to partially dry before installing membrane roofing. Firmly press the membrane into the adhesive layer by rolling with rollers. Adhesive bonding times will vary depending upon weather conditions.

Clean seam areas, overlap membrane roofing and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufactures recommendations to ensure a watertight seam installation. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.

Spread adhesive over drain flange at roof drains and securely seal membrane roofing membrane in place with clamping ring.

Notes:

- Do not apply adhesive during temperatures below 50ºF (10ºC) are expected during application or subsequent drying time.
- Store adhesive between 50°F (10°C) and 80°F (27°C) in a dry area out of direct sunlight.
- Do not open adhesive cans prior to time of use.
- Exposure to moisture will cure the adhesive.
- Use all product in opened containers immediately.
- Do not apply adhesive in seaming areas.
- Do not apply low slope adhesive (VOC Free) on vertical or sloped surfaces greater than 2 inches in 12 inches. Use manufacturers recommended vertical adhesive at those locations.
- All membrane shall be applied in the same manner.
- Do not apply adhesive during inclement weather.
- Do not apply adhesive to wet surfaces.
- The membrane installer shall keep records of amount of adhesive used per area per day to verify conformance to the specified adhesive rate.
- Complete heat welding of all membrane and flashing seams immediately the same day the membrane or flashing is installed.

- Mechanically fasten membrane at roof perimeters and penetrations on vertical surfaces to greatest extent possible as indicated on the drawings.

3.08 MEMBRANE BASE FLASHING: Install base flashings and preformed flashing accessories and adhere to substrates according to manufactures recommendations. Apply adhesive to substrate and underside of flashing at required rate and allow to partially dry. Do not apply adhesive to seam area of flashing.

Flash penetrations and field formed inside and outside corners or with manufacturers preformed membrane accessories.

Clean seams areas, overlap and hot air-weld seams to ensure a watertight seam installation.

Terminate and seal top of sheet flashing with sealant and termination bar.

Over the properly installed and prepared flashing substrate, apply high slope membrane adhesive. Apply the adhesive in smooth, even coats with no gaps, globs or similar inconsistencies. Firmly press the sheet in place with a hand roller. Do not apply adhesive in seam areas that are to be welded. Install all membrane flashing in the same manner, overlapping the edges and hot-air welding.

Parapet: At parapets less than 30 inches in height, extend membrane base flashing up and over top of wall as indicated on the Drawing.

Counterflashing: At counterflashing locations, extend membrane base flashing a minimum of 8 inches above the main roof membrane and terminate with a continuous termination bar. Secure termination bar with fastener type indicated on the drawing, 8 inches on center.

All membrane base flashing shall be consistently adhered to substrates.

All interior and exterior corners and miters shall be cut and hot-air welded into place.

Membrane base flashing that exceed 30 inches in height shall receive additional securement.

3.09 HOT-AIR WELD ROOFING SEAMS: Maintain clean seams at all times. Hot air-weld side and end laps of membrane roofing and sheet flashings. Test lap edges with probe. Do not apply adhesive to seams.

Hand-Welding: Hand-welded seams shall be completed in two stages. Hot-air welding equipment shall be allowed to warm up for at least one minute prior to welding. The back edge of the seam shall be welded with a narrow but continuous weld to prevent loss of hot air during the final welding. The nozzle shall be inserted into the seam at a 45 degree angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," the hand roller is positioned perpendicular to the nozzle and rolled lightly. For straight seams, the 1-1/2 inch wide nozzle is recommended for use. For corners and compound connections, the 3/4 inch wide nozzle shall be used.

Machine Welding: Machine welded seams are achieved by the use of automatic welding equipment. Follow membrane manufacturer’s instructions and local codes for electric supply, grounding and over current protection. Metal tracks may be used over the deck membrane and under the machine welder to minimize or eliminate wrinkles.

The Contractor shall check all welded seams for continuity using a rounded screwdriver. Visible evidence that welding is proceeding correctly is smoke during the welding operation, shiny membrane surfaces, and an uninterrupted flow of dark grey material from the underside of the top membrane. On-site evaluation (probing) of welded seams shall be made daily by the Installer of 100 percent of seams. One inch wide cross-section samples of welded seams shall be taken at least twice a day to verify weld construction. Correct welds display failure from

shearing of the membrane prior to separation of the weld. Each test cut shall be patched by the installer at no extra cost to the Owner. Provide water tight temporary tie-ins to existing roofing system daily or when rain/precipitation is forecast. Remove temporary tie-ins when completing adjacent roof sections.

3.10 COPING: After single ply membrane has been extended up and over parapet, field verify dimensions and fabricate coping as shown on the Drawings.

Prefabricate corners and end pieces in shop with mitered sealed and pop riveted joints.

Fabricate continuous cleats from aluminum and fasten with nailins, 16 inches on center, on outside face of walls as shown on Drawing. Hook outside face of coping over cleat and secure roof side with stainless nailins with neoprene washers, 24 inches on center. Extend outside face of coping 2 inch minimum below precast concrete coping termination and brick beginning where brick exists below precast concrete. Roof side and outside face of coping should extend 4 inch minimum.

Install 12 inch wide backup, apply bead of sealant along each edge, then set coping with 1/4 inch gap between sections. Apply bead of sealant to ends of coping sections and cover with 6 inch wide cover plates, centered at joints. Hook cover plates over coping drip edge on inside and outside face of wall and crimp.

At sides of elevator penthouse and side roof coping intersection, turn up coping at rising penthouse wall and extend under newly installed reglet counterflashing. Seal any exposed ends of coping with sealant as indicated on Drawings.

3.11 EXSITING RECEIVER FLASHING: At areas indicated, clean, trim and form existing through wall flashing into receiver for new stainless steel counterflashing. Inspect joint immediately above flashing and tuckpoint as required.

3.12 REGELET RECEIVER: Fabricate receiver flashing from material indicated and profile as shown on Drawing. At a minimum of 8 inches above finish elevation of the new roof, saw-cut existing horizontal mortar joint to a depth of 1 1/2 inches. Do not spall edges of masonry units or widen joints. Remove mortar from masonry surfaces within joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum or flush joints to remove dirt and loose debris.

Install receiver flashing into reglet. Provide 4 inch lap joints and solder watertight. Secure with lead wedges, 24 inches on center.

Repoint joint with mortar. Flush joints with clean water immediately before applying mortar to remove all dirt and debris and saturate joint. Apply mortar in thin (1/4 inch) layers. Each layer should become "thumb-print" hard before applying next layer. Tool joints to match adjacent existing joints, with mortar tightly bonded to sides of brick units. Clean all excess mortar from face of masonry within 24 hours.

At rear corner of elevator penthouse extend counterflashing around corner 6 inch minimum.

Where existing through wall flashing exists install new flashing under existing and seal to existing flashing with sealant.

3.13 COUNTERFLASHING: Fabricate counterflashing from material indicated and lap base flashing 4 inches minimum, fabricate with 5/8 inch hemmed drip edge at 45 degree angle at base and crimp in face so when installed “spring action” causes counterflashing to hug base flashing

at the bottom edge. Provide 4 inch lap joints and seal with concealed bead of sealant. Slip counterflashing into receiver flashing and fasten with stainless steel screws and neoprene washers, 16 inches on center. Provide a minimum of 2 fasteners per piece.

3.14 VENT PIPES AND EQUIPMENT POST: Install single ply main roofing membrane as noted above. Secure with 4 equally spaced stainless steel fastening plates and screws as shown on the Drawing extend down into structural deck below (concrete or metal deck – insulating concrete is not "structural"). Install premanufactured flashing boot over existing vent pipe and hot air-weld to membrane. Field wrap flashing around equipment post and hot-air weld to membrane. Apply multi-propose sealant at joint between the existing pipe and the top of the boot. Install stainless steel band clamp and tighten to secure where required, provide vent pipe extensions to obtain minimum flashing heights. Secure vent pipe extensions to existing pipes with Fernco style fittings.

3.15 GUTTER AND DRIP EDGE: Install gutter and drip edge as indicated on Drawings. Fasten gutter with gutter straps 36 inches on center. Neatly trim drip edge to allow gutter straps to be fastened to wood fascia board. Set drip edge on completed membrane in full bed of water cut off mastic. Secure with nails 3 inches on center, set ¾ inch in from back edge. Lap stripping over cleaned membrane and drip edge flange and heat weld to both, watertight. Provide gutter outlet tube set in bottom of gutter in full bed of sealant and pop riveted into place. Connect existing downspout to outlet tube.

3.16 THROUGH-WALL FLASHING (ROWLOCK CAPPED BRICK WALL, LOW ROOF): At locations indicated, remove brick as required to install new through-wall flashing. Carefully remove entire units from joint to joint and salvage to the extent possible, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

Provide temporary weather protection at all locations where masonry is removed. Do not allow moisture to penetration openings into the building.

Remove in an undamaged condition as many whole bricks as possible.

Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.

Remove sealants by cutting close to brick with utility knife and cleaning with solvents.

Store brick for reuse. Store off ground, on skids, and protected from weather.

Fabricate sheet metal flashing as indicated on drawings. Provide receiver at outside bottom edge of flashing. Turn back leg of flashing up on masonry back-up wall and secure. Provide end dams at all terminations. Solder flashing seams water tight.

Prime prepared substrates and install self-adhering through-wall membrane flashing. Lap and seal seams as recommend by manufacture and immediately roll membrane and all seams to ensure bond with substrate. Cut out and patch all wrinkles and folds in the membrane flashing that extend to within ½ inch of the edge of membrane edge (including lap edges between adjacent membrane sections). Lap and fully seal all seams. Secure top edge as indicated.

Replace removed damaged brick with other removed brick in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.

Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.

Maintain joint width for replacement units to match existing joints.

Use setting buttons or shims to set units accurately spaced with uniform joints.

Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.

Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.

When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

Provide weep vents at every third head joint in masonry course immediately above through-wall flashing installation.

3.17 ROUGH CARPENTRY: Discard units of material with defects that impair quality of carpentry and that are too small to use with minimum number of joints or optimum joint arrangement.

Apply field treatment complying with AWPA M4 to cut surfaces of preservative-treated lumber and plywood.

Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as required for accurate fit.

Securely attach carpentry work as indicated and according to applicable codes and recognized standards. Use fasteners of appropriate type and length where not identified on Drawing. Predrill members when necessary to avoid splitting wood.

Install treated wood nailers to form curbs as shown on Drawing. Place constructed curb on insulating concrete deck or concrete deck as shown on Drawing and fasten with screws as indicated to structural deck. Secure wood nailers intersecting at corners of curbs with three nails at each corner.

Repair existing deteriorated wood blocking/nailers by cutting out deteriorated areas and replacing with new material matching size of removed material. Anchor ends of existing material adjacent to cut out areas and install new wood to fill in area of material. Fasten with nails or screws, 12 inches on-center staggered. Provide a minimum of 2 fasteners for every piece of wood installed.

3.18 CURBS: Remove, reset and fasten existing vent, exhaust fan and hatch curbs on treated wood nailers as required to match height of insulation and cover board and to maintain 8 inch curb height above surface of new roof membrane. At existing vent and exhaust fan fasten prefinished aluminum counterflashing at top of curb with screws 2 per side. Coordinate with Owner regarding electrical shut down of fans before moving fans.

3.19 ABANDONED CURBS: Remove existing covers, curbs and wood framing at abandoned curbs. Install metal angle and bolt to existing metal angle 18 inch on center. Set new metal deck on installed angles to span short dimension of each opening. Secure decking with

screws or puddle welding. Fill with polyisocyanurate insulation to match height of adjacent insulating concrete. Mechanically fasten (2) ½ inch thickness of ToughRock Fireguard boards to underside of metal deck. Seal joints and all openings/perimeters with fire stop sealant. .

3.20 CONDUIT ENCLOSURE: Coordinate disconnection or protecting of existing wiring with Tele-Communications representative and Owner. Install conduit enclosure curb as shown on Drawing and as described in "Rough Carpentry" Paragraph.

Fabricate enclosure from 20 gage stainless steel as shown on Drawing to flash existing piping and wiring penetrations for unit. Solder all joints of cover and base watertight. Route wires and conduits through enclosure and slope to drain away from enclosure. Reconnect to existing equipment. Pack interior space loosely with fiberglass batt insulation.

3.21 WALK AND ISOLATION PADS: Install walk pads in common walk areas to access all rooftop equipment and side roofs. Place isolation pads over walk pads and install under rooftop equipment that is to sit on the single ply membrane. Install walkpads with heat welds or adhere to membrane with compatible adhesive according to manufactures recommendations.

3.22 ROOF DRAINS (Low Roof): At new drain locations neatly cut hole in insulating concrete and metal deck. Set drain body in gypsum grout. Run drain lines along length of structural beams within ceiling cavity. Connect to existing leaders near abandoned roof drains. Provide plumbing accessories required to tie into existing storm drain lines. Flash drains as shown on Drawing and provide sump. If roof drain flashing causes a dam around drain, Contractor will be required to remove and reinstall drain.

Set and flash roof drains immediately (same day) following demolition of existing roofing. Immediately after flashing new drain, plug with standard plumbing stopper, 2 inches below top of storm drain line. Flood drain. Check for and repair drain and flashing leaks.

3.23 ROOF DRAINS (Main/Side Roofs): At existing drain locations remove existing drain and assembly and install new drain body in gypsum grout. Provide plumbing accessories required to tie into existing storm drain lines. Flash drains as shown on Drawing and provide sump around drain. If roof drain flashing causes a dam around drain, Contractor will be required to remove and reinstall drain.

Set and flash roof drains immediately (same day) following demolition of existing roofing. Immediately after flashing new drain, plug with standard plumbing stopper, 2 inches below top of storm drain line. Flood drain. Check for and repair drain and flashing leaks.

3.24 PITCH PANS: Install treated wood nailers around penetration as required to match height of roof sheathing. Mechanically fasten to structural deck. Form pitch pan with laminated sheet metal. Fasten 4 inch flanges to wood nailers 4 per side. Hot-air weld single ply membrane flashing strip to flanges. Place 2 inch thick non shrink grout with bond breaker with 2 inch pourable pitch pan filler over the top. Slope pitch pan filler to shed water.

3.25 LIGHTNING PROTECTION: Reattach lightning rods, cables and plates to metal coping with screws with neoprene washers. Seal around all fasteners and plates with sealant.

3.26 COMMUNICATIONS EQUIPMENT: Coordinate with Owner and communications agent for removal and reinstallation of all affected communications equipment to ensure telecom is given proper notice to lift/move/protect their equipment as required to allow roof replacement.

Install conduit saddle for communications along side roofs to straddle the new coping.

3.27 PAINTING (MISCELLANEOUS): Clean, prime and paint existing elements scheduled for repainting. Test existing paint for presence of lead based paint products (assume all paint is lead based) and proceed with work following lead safe work practices. Prime prepared surfaces metal primer compatible with substrate then apply two cover coats of finish paint.

Mix and prepare painting materials in accordance with manufacturer's directions. Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue. Stir materials before application to produce a mixture of uniform density, and stir as required during application. Do not stir surface film into material. Remove film and, if necessary, strain material before using.

Apply paint only when temperature of surfaces to be painted and surrounding air temperatures are above 50 deg F. Do not paint over dirt, loose rust, scale, grease, moisture, loose paint, or conditions otherwise detrimental to formation of a durable paint film.

Apply primer to prepared surfaces as soon as practicable after preparation and before subsequent surface deterioration. Apply primer and paint evenly free from sags, runs, crawls, holidays or defects. Recoat primed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing. Apply primer and two coats of paint by brush in strict accordance with recommendations of the paint manufacturer. Allow each coat to thoroughly dry before succeeding coat application.

Apply additional top coats of paint as required to provide even and uniform surface.

3.28 PROTECTION AND CLEANING: Protect membrane roofing system from damage and wear during construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage.

Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer.

Maintain a clean and safe site at all times. Keep site free of unnecessary accumulation of tools, equipment, surplus materials and debris. Remove all debris and trash related to work from the site daily.

As work progresses, promptly remove spilled, splattered and splashed materials that will be difficult to clean or remove later. Leave premises neat and clean daily, to the satisfaction of the Owner.

END OF SECTION